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EFFICACY OF DIMILIN ON RANGE CATERPILLAR LARVAE

I. INTRODUCTION

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The range caterpillar is a serious pest in northeastern and central New Mexico. Combined economic control costs were in excess of \$4,000,000 in 1976 and may be double that amount in 1977. At

Subject: Final Report on "Efficacy of Dimilin on Range Caterpillar", Cooperative Agreement 12-14-5001-277 with New Mexico State University

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To: L. E. Myers, AD
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H. C. Cox, WR DA
P. H. Schwartz, Jr., NPS
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program. The Dylox^R formulation produced less than desired results in certain areas in the 1976 control program. Also, the Dylox^R formulation prepared by Dr. Ellis Huddleston, NMSU.

is not readily available in the required quantities and Dylox^R has appeared on the RPAR list. A more effective, economical, and less environmentally

H. M. Graham
Research Leader

Dimilin^R, an insect growth regulator with very low mammalian toxicity, was shown to be efficacious against range caterpillar in two tests conducted in 1976. One test was conducted by ~~U. S. DEPT. OF AGRICULTURE
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Data from both experiments show that the material is efficacious and indications are that the dosage required is within a reasonable range.

OBJECTIVES:

1. Determine dosage of Dimilin required for range caterpillar control.
2. Obtain residue data required for registration.
3. Obtain environmental impact data required for registration.
4. Obtain benefit exposure data required for registration.

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EFFICACY OF DIMILIN ON RANGE CATERPILLAR LARVAE

I. INTRODUCTION

The range caterpillar is a serious rangeland pest in northeastern and central New Mexico. Combined economic losses and control costs were in excess of \$4,000,000 in 1976 and may be double that amount in 1977. At the present time, the only workable management tool is large-scale chemical control. Only two insecticide formulations are currently registered for use on range caterpillar. Each of these has serious limitations. The Sevin^R formulation produced highly erratic control in the 1975 control program. The Dylox^R formulation produced less than desired results in certain areas in the 1976 control program. Also, the Dylox^R formulation is not readily available in the required quantities and Dylox^R has appeared on the RPAR list. A more effective, economical, and less environmentally hazardous pesticide is needed.

Dimilin^R, an insect growth regulator with very low mammalian toxicity, was shown to be efficacious against range caterpillar in two tests conducted in 1976. One test was conducted by USDA, APHIS, and the other test was conducted by the New Mexico Agricultural Experiment Station. Data from both experiments show that the material is efficacious and indications are that the dosage required is within a reasonable range.

OBJECTIVES:

1. Determine dosage of Dimilin required for range caterpillar control.
2. Obtain residue data required for registration.
3. Obtain environmental impact data required for registration.
4. Obtain benefit exposure data required for registration.

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II. MATERIALS AND METHODS:

The efficacy of Dimilin^R on range caterpillar larvae, in New Mexico, was evaluated in nine experiments during 1977. In three experiments Dimilin 25% WP was applied at rates of .0075 lb., 0.15 lb. and .02 lb. per acre along with a standard of Dylox 1.5 oil at a rate of .25 lb./acre. One of these experiments was performed in Colfax County, one in Harding County, and two in Lincoln County. Four more experiments, all in Lincoln County, utilized Dimilin 25% WP at treatment rates of 0.1 lb., 0.15 lb., and .03 lb. per acre along with a standard of Sevin 4 Oil at a rate of .5 lb./acre. The Dimilin was applied at a total spray volume of one qt./acre, the Dylox 1.5 oil at 21 oz./acre and the Sevin 4 Oil (at a mixture of 1 parts Diesel oil to 4 parts Sevin 4 Oil) at 20 oz./acre. Six of the above seven experimental areas were divided into 40 acre plots and the four treatments were either completely randomized or assigned at random to create a randomized complete block design with three replicates. The one exception was in Lincoln County where space permitted only 12 square 25.6 acre plots. These treatments were also randomized and replicated three times. In all of the above experiments untreated controls were utilized and incorporated in the randomization when space permitted. Another experiment, applying Dimilin 25% WP at a rate of .015 lb./acre and a volume of 1 qt./acre, was performed three miles south of Clayton, New Mexico. Early pupation was detected here and further research into Dimilin's carryover capability through pupation is expected. The final experiment was a volume test, in Lincoln County, applying Dimilin 25% WP .015 lb./acre at volumes of 1 pt., 1qt., 2 qts. and 3 qts. per acre. Each treatment was replicated four times. Included in this experiment were two replicates each of Sumathion at .25 lb./acre and Orthene at .5 lb./acre; both at a volume of 1 qt./acre. All plots in this experimental area were completely randomized.

All applications of material were made aerially with a Cessna Agwagon, delivering a 75 foot swath at 40 psi with No. 8003 flat-fan nozzles directed straight down. All spraying was done in the early morning hours (@ 5:30 to 10:00 a.m. MDT) in order to minimize wind drift and surface heat factors.

Efficacy was evaluated by counting two 100 yd. x 1 yd. transects per test plot. These were generally located in the middle of the plot, supplying an adequate buffer against contamination. These sample areas were counted before each treatment and at 7, 14, 21 and 28 days posttreatment.

Soil and foliage samples for residue analysis were collected from the Dimilin plots of four experiments (two of the lower dosage experiments and two of the higher dosage experiments) at intervals of 0, 3, 7, 14, 21 and 28 days posttreatment. Samples were placed in residue bags and field stored in ice chests, then placed in freezers at the end of the day.

Due to the possibility of livestock contamination, an electric fence was placed along the edges of experimental areas when necessary.

(A) Experiment 1: Chet Mitchell Ranch, Roy, New Mexico.

This area was composed of a 600 acre tract of rangeland divided into 15-40 acre plots (including controls) and randomized to create a randomized complete block design (Appendix I). Treatments were Dimilin at .0075 lb./acre, .015 lb./acre, and .01 lb./acre and Dylox 1.5 oil at .25 lb./acre. Pretreatment samples were counted on July 15 and 16 with 4th and 5th instar larvae observed in prevalent numbers. Applications were made on July 17 between 5:30 and 10:00 a.m.; wind velocities ranged from 2 - 10 mph

and cloud cover was negligible. Two miles of electric fence was placed on the east edge of the experimental area.

(B) Experiment 2: Phil Gillespie Ranch, Abbott New Mexico.

This area was also composed of 600 acres of rangeland divided into 15 - 40 acre plots (including controls) and set up as a randomized complete block design (Appendix II). Treatments were Dimilin at .0075 lb./acre, .015 lb./acre, and .02 lb./acre and Dylox 1.5 oil at .25 lb./acre. Pretreatment samples, counted on July 17, also indicated a prevalence of 4th and 5th instar larvae. Applications of material were made on July 18 between 6:00 and 10:00 a.m.; wind velocities ranged from 2 - 8 mph. Cloud cover was negligible, however this area had experienced rain totalling up to three inches the previous week.

(C) Experiment 3: Three miles south of Clayton, New Mexico.

This experimental area consisted of a 320 acre tract. (Appendix III). The entire area was treated with Dimilin at ca. .011 lb./acre at a spray volume of .75 qt./acre. This area contained 5th and 6th instar larvae. Applications were made on July 21 between 6:00 and 7:15 a.m.; wind velocities ranged from 5 - 7 mph out of the Northeast, and conditions were overcast and cool. First time counts were made seven days after treatment and then every seven days following.

(D) Experiment 4: Roadrunner Ranch, Corona, New Mexico.

480 acres of flat rangeland was selected for this experiment. The area was divided into twelve 40 acre plots and completely randomized. Three untreated control areas (two 100 yard transects

per area) were set out directly adjacent and south of the treated area (Appendix IV). Treatments were Dimilin at .01 lb., .015 lb., .03 lb. per acre and Sevin 4 Oil at .5 lb. per acre. Pretreatment samples were counted on July 21 and 2nd and 3rd instar larvae were observed as prevalent. Applications were made on July 22 between 6:00 and 10:00 a.m.; wind velocities ranged between 2 - 7 mph, temperatures were cool and cloud cover was scattered. Within one hour after completion of spraying this area experienced slight rainfall. Two miles of electric fence was placed on the west and south edges of the experimental area.

(E) Experiment 5: Marley Ranch (area I), Corona, New Mexico. This area consisted of a 480 acre tract divided into twelve 40 acre plots which were set up in a randomized complete block design. Three 40 acre control plots were set up outside of the treatment area, however only two were utilized (Plots 27 and 32 - Appendix V). Treatments were Dimilin at .0075 lb., .015 lb., and .02 lb./acre, and Dylox 1.5 at .25 lb./acre. Pretreatment samples, counted on July 20, indicated a prevalence of 2nd and 3rd instar larvae. Applications were made on July 23 between 6:00 and 10:00 a.m.; wind velocities ranged between 2 - 6 mph, cloud cover was negligible and the temperature began to rise quickly in the morning.

(F) Experiment 6: Owen's Ranch, Corona, New Mexico
This area consisted of twelve 26.5 acre plots. Due to lack of space two standard plots were located in a pasture, containing livestock, slightly separated from the other ten plots. All plots, except for the separated standards, were completely randomized

(Appendix VI). Treatments were Dimilin at .01 lb., .015 lb. and .03 lb. per acre and Sevin 4 Oil at .5 lb./acre. Pretreatment samples, counted on August 4, indicated mostly 2nd and 3rd instar larvae. Applications were made on August 5 between 6:00 and 10:00 a.m.; wind velocities ranged between 2 - 6 mph with scattered and increased overcast later in the morning. This area experienced slight rainfall within an hour after completion of spraying.

(G) Experiment 7: Marley Ranch (area II), Corona, New Mexico. This area, like Marley area I, also consisted of twelve 40 acre plots set up in a randomized complete block design and utilizing plots 27 and 32 as untreated controls (Appendix V). Treatments were Dimilin at .0075 lb., .015 lb. and .02 lb. per acre and Dylox 1.5 oil at .25 lb./acre. Pretreatment samples were counted on August 4 and August 5 and 2nd and 3rd instar larvae were observed as prevalent. Applications were made on August 6 between 6:00 and 10:00 a.m.; wind velocities ranged between 2 - 10 mph and cloud cover was negligible.

(H) Experiment 8: Marley Ranch (area III), Corona, New Mexico. Again, this area was divided into twelve 40 acre plots utilizing a randomized complete block design and plots 27 and 32 as untreated controls (Appendix V). Treatments were Dimilin at .01 lb., .015 lb., and .03 lb. per acre and Sevin 4 Oil at .5 lb./acre. Pretreatment samples were counted on August 7 and again 2nd and 3rd instar larvae were prevalent. Treatments were applied on August 8 between 6:00 and 10:00 a.m.; wind velocities ranged between 2 - 6 mph and cloud cover was negligible.

(I) Experiment 9: Roadrunner Ranch, Corona, New Mexico.

This experiment was the volume test which consisted of an 864 acre tract divided up into twenty 40 acre plots plus four 32 acre plots. All plots, including the untreated controls, were replicated four times and completely randomized (Appendix VII). Treatments were Dimilin .015 lb./acre at spray volumes of 1 pt., 1 qt., 2 qts., and 3 qts. per acre. Treatments of Sumathion at .25 lb./acre and Orthene at .5 lb./acre, both at a volume of 1 qt./acre and replicated twice, were included in this experiment. Pretreatment samples were counted on August 10 and 11 and 2nd and 3rd instar larvae were prevalent. Applications began on August 10 at 6:00 a.m. but had to be ceased following the fourth replicate of 3 qts./acre (applied first) because of excessive winds (at 10 - 15 mph). The following day (August 11) applications were made between 6:00 a.m. and 10:00 a.m.; wind velocities ranged between 2 - 8 mph and cloud cover was negligible. In order to keep out livestock, 1 3/4 miles of electric fence was put up on the east and south sides of the experimental area.

III. DISCUSSION AND RESULTS:

Overall, the results of the five different Dimilin rates did not differ significantly for any of the nine experiments. However, for each experiment results indicated much less control at seven days posttreatment than at 14, 21 and 28 days posttreatment. Efficacy doesn't appear to differ significantly between 14, 21 and 28 days posttreatment. The same results appear to hold true for the volume test. Overall, efficacy on range

caterpillar larvae, after 28 days posttreatment averaged 99.3%, 99.9%, 99.7%, 99.1% and 100% for the .0075 lb., .01 lb., .015 lb., .02 lb. and .03 lb. doses of Dimilin, respectively, 99.7% for Dylox 1.5 (.25 lb./acre) and 87.8% for the Sevin 4 Oil (.5 lb./acre). The results for each experiment are shown in the attached tables 1 thru 9.

Table 1. Efficacy of Dimilin and Dylox 1.5 for control of Range Caterpillar.
 Experiment 1, Chet Mitchell Ranch, Roy, N.M. July 17 to August 14

| Material and Rate ai/A | REP | Pretreatment | | Posttreatment | | | |
|------------------------|-----------|---------------------------------|--|---------------------|---|-------|-------|
| | | Avg. No. of Larvae/100 sq. yds. | | Avg. % Mortality at | 7 | 14 | 21 |
| Dimilin .0075 lb. | 1 | 135 | | 45.3 | - | 80.6 | 97.6 |
| | 2 | 867 | | 53.8 | - | 99.1 | 99.4 |
| | 3 | 879 | | 60.4 | - | 97.2 | 98.8 |
| | \bar{x} | 627 | | 45.6 | - | 92.3 | 98.6 |
| Dimilin .015 lb. | 1 | 579 | | 24.8 | - | 96.6 | 98.0 |
| | 2 | 431 | | 91.6 | - | 98.1 | 99.4 |
| | 3 | 429 | | 44.7 | - | 97.6 | 98.8 |
| | \bar{x} | 479 | | 53.7 | - | 97.4 | 99.7 |
| Dimilin .02 lb. | 1 | 69 | | -39.1 | - | 90.0 | 97.9 |
| | 2 | 210 | | 78.1 | - | 97.7 | 100.0 |
| | 3 | 421 | | 26.0 | - | 97.8 | 99.8 |
| | \bar{x} | 233 | | 21.7 | - | 95.2 | 99.2 |
| Dylox 1.5 (.25 lb.) | 1 | 637 | | 98.2 | - | 99.7 | 99.9 |
| | 2 | 700 | | 94.9 | - | 96.3 | 98.0 |
| | 3 | 1209 | | 98.9 | - | 98.6 | 99.2 |
| | \bar{x} | 849 | | 97.3 | - | 98.2 | 99.0 |
| Control | 1 | 224 | | 12.5 | - | 28.8 | 74.3 |
| | 2 | 431 | | -113.7 | - | -67.0 | 16.0 |
| | 3 | 350 | | 5.4 | - | 40.5 | 63.5 |
| | \bar{x} | 335 | | -35.5 | - | 0.75 | 40.6 |

Table 2. Efficacy of Dimilin and Dylox 1.5 for Control of Range Caterpillar.
 Experiment 2, Phil Gillespie Ranch, Abbot, New Mexico. July 18 to August 15.

| Material and Rate ai/A | REP | Pretreatment | | Posttreatment | | | |
|------------------------|-----------|---------------------------------|-------|---------------|--------|-------|----|
| | | Avg. No. of Larvae/100 sq. yds. | | 7 | 14 | 21 | 28 |
| Dimilin .0075 lb. | 1 | 692 | 96.3 | - | 99.8 | 100.0 | |
| | 2 | 164 | -40.5 | - | 96.3 | 98.2 | |
| | 3 | 139 | -39.5 | - | 99.6 | 100.0 | |
| | \bar{x} | 332 | 5.5 | - | 98.6 | 99.4 | |
| Dimilin .015 lb. | 1 | 131 | -34.9 | - | 93.0 | 96.3 | |
| | 2 | 98 | 31.0 | - | 98.1 | 100.0 | |
| | 3 | 105 | 69.8 | - | 100.0 | 100.0 | |
| | \bar{x} | 111 | 21.9 | - | 97.0 | 98.8 | |
| Dimilin .02 lb. | 1 | 383 | 60.2 | - | 99.4 | 100.0 | |
| | 2 | 533 | 45.9 | - | 99.2 | 99.5 | |
| | 3 | 215 | 94.1 | - | 99.6 | 100.0 | |
| | \bar{x} | 377 | 66.7 | - | 99.4 | 99.8 | |
| Dylox 1.5 (.25 lb.) | 1 | 1004 | 99.3 | - | 99.8 | 99.9 | |
| | 2 | 454 | 97.1 | - | 97.7 | 99.3 | |
| | 3 | 188 | 96.8 | - | 99.4 | 99.9 | |
| | \bar{x} | 549 | 97.7 | - | 99.0 | 99.7 | |
| Control | 1 | 737 | 13.6 | - | 69.5 | 79.7 | |
| | 2 | 323 | -53.9 | - | -107.5 | -66.8 | |
| | \bar{x} | 530 | -20.1 | - | 19.0 | 6.5 | |

Table 3. Efficacy of Dimilin at .015 lb. ai/acre for control of Range Caterpillar Experiment 3, 3 miles south of Clayton, New Mexico. July 21 to August 18, 1977.

| Material and Rate ai/A | REP | PRETREATMENT | | POSTTREATMENT | | | | |
|------------------------|-----------|---------------------------------|--|------------------|-------------------|--------|----|----|
| | | Avg. No. of Larvae/100 sq. yds. | | Avg. % Mortality | at Indicated Days | 7 | 14 | 21 |
| Dimilin .015 lb. | 1 | 170 | | - | 57.1 | 70.0 | | - |
| | 2 | 156 | | - | 75.0 | 67.9 | | - |
| | \bar{x} | 163 | | - | 66.0 | 51.5 | | - |
| Control | 1 | 43 | | - | 11.6 | -109.0 | | - |
| | 2 | 27 | | - | 51.9 | -122.0 | | - |
| | \bar{x} | 35 | | - | 31.8 | -115.5 | | - |

Table 4. Efficacy of Dimilin and Sevin 4 Oil for control of Range Caterpillar.
Experiment 4, Roadrunner Ranch, Corona, New Mexico. July 22 to August 19, 1977.

| Material and Rate ai/A | REP | Pretreatment | | Posttreatment | | | Days |
|------------------------|-----------|---------------------------------|------|-------------------|--------------|-------|------|
| | | Avg. No. of Larvae/100 sq. yds. | 7 | % Mortality at 14 | Indicated 21 | 28 | |
| Dimilin .01 lb. | 1 | 318 | 84.3 | 99.5 | 100.0 | 100.0 | |
| | 2 | 686 | 78.5 | 99.2 | 99.9 | 100.0 | |
| | 3 | 365 | 82.1 | 100.0 | 99.6 | 99.8 | |
| | \bar{x} | 456 | 81.6 | 99.5 | 99.9 | 99.9 | |
| Dimilin .015 lb. | 1 | 637 | 83.1 | 99.4 | 100.0 | 100.0 | |
| | 2 | 628 | 91.2 | 100.0 | 100.0 | 100.0 | |
| | 3 | 288 | 89.3 | 100.0 | 100.0 | 100.0 | |
| | \bar{x} | 518 | 87.9 | 99.8 | 100.0 | 100.0 | |
| Dimilin .03 lb. | 1 | 983 | 95.7 | 100.0 | 100.0 | 100.0 | |
| | 2 | 623 | 94.2 | 100.0 | 100.0 | 100.0 | |
| | 3 | 523 | 96.7 | 100.0 | 100.0 | 100.0 | |
| | \bar{x} | 710 | 95.5 | 100.0 | 100.0 | 100.0 | |
| Sevin 4 (.5 lb.) | 1 | 793 | 98.7 | 100.0 | 100.0 | 100.0 | |
| | 2 | 988 | 79.7 | 86.9 | 94.6 | 95.8 | |
| | 3 | 554 | 87.7 | 100.0 | 99.5 | 98.9 | |
| | \bar{x} | 778 | 88.7 | 95.6 | 98.0 | 98.2 | |

Table 5. Efficacy of Dimilin and Dylox 1.5 for control of Range Caterpillar.
 Experiment 5, Marley Ranch, Corona, New Mexico. July 23 to August 20.

| Material and Rate ai/A | REP | Pretreatment | | Posttreatment | | |
|------------------------|-----------|---------------------------------|------|---------------------|----------------|---|
| | | Avg. No. of Larvae/100 sq. yds. | | Avg. % Mortality at | Indicated Days | |
| | | 7 | 14 | 21 | 28 | |
| Dimilin .0075 lb. | 1 | 421 | 97.8 | 100.0 | 100.0 | - |
| | 2 | 102 | 86.5 | 100.0 | 100.0 | - |
| | 3 | 71 | 16.7 | 100.0 | 100.0 | - |
| | \bar{x} | 198 | 67.0 | 100.0 | 100.0 | - |
| Dimilin .015 lb. | 1 | 132 | 96.9 | 100.0 | 100.0 | - |
| | 2 | 116 | 89.5 | 100.0 | 100.0 | - |
| | 3 | 28 | 87.5 | 100.0 | 100.0 | - |
| | \bar{x} | 92 | 91.3 | 100.0 | 100.0 | - |
| Dimilin .02 lb. | 1 | 95 | 97.5 | 100.0 | 100.0 | - |
| | 2 | 36 | 87.5 | 100.0 | 100.0 | - |
| | 3 | 23 | 84.6 | 100.0 | 100.0 | - |
| | \bar{x} | 52 | 89.9 | 100.0 | 100.0 | - |
| Dylox 1.5 (.25 lb.) | 1 | 182 | 94.4 | 100.0 | 100.0 | - |
| | 2 | 61 | 97.4 | 100.0 | 100.0 | - |
| | 3 | 178 | 99.7 | 100.0 | 100.0 | - |
| | \bar{x} | 140 | 97.2 | 100.0 | 100.0 | - |
| Control | 1 | 249 | 4.8 | 31.1 | 23.8 | - |
| | 2 | 184 | 26.5 | 42.8 | 56.6 | - |
| | \bar{x} | 216 | 15.6 | 36.9 | 40.2 | - |

Table 6. Efficacy of Dimilin and Sevin 4 Oil for control of Range Caterpillar.
 Experiment 6, Owens Ranch, Corona, New Mexico. August 5 to September 2, 1977.

| Material and Rate ai/A | REP | Pretreatment | | Posttreatment | | | Days |
|------------------------|-----------|---------------------------------|--|---------------|-------|--------|------|
| | | Avg. No. of Larvae/100 sq. yds. | | 7 | 14 | 21 | |
| Dimilin .01 lb. | 1 | 248 | | 86.7 | 100.0 | 100.0 | - |
| | 2 | 186 | | 68.7 | 100.0 | 100.0 | - |
| | 3 | 149 | | 83.0 | 100.0 | 100.0 | - |
| | \bar{x} | 194 | | 79.4 | 100.0 | 100.0 | - |
| Dimilin .015 lb. | 1 | 321 | | 50.7 | 100.0 | 100.0 | - |
| | 2 | 121 | | 84.4 | 100.0 | 100.0 | - |
| | 3 | 289 | | 69.5 | 97.0 | 98.3 | - |
| | \bar{x} | 244 | | 65.6 | 99.0 | 99.4 | - |
| Dimilin .03 lb. | 1 | 222 | | 41.1 | 98.7 | 99.8 | - |
| | 2 | 251 | | 65.5 | 99.9 | 100.0 | - |
| | 3 | 64 | | 46.9 | 100.0 | 100.0 | - |
| | \bar{x} | 179 | | 61.6 | 99.5 | 99.9 | - |
| Sevin 4 (.5 lb.) | 1 | 381 | | 90.2 | 96.4 | 98.6 | - |
| | 2 | 55 | | 10.4 | 82.1 | 93.7 | - |
| | 3 | 130 | | 41.4 | 68.7 | 59.8 | - |
| | \bar{x} | 189 | | 47.3 | 82.4 | 84.0 | - |
| Control | 1 | 123 | | | | -170.2 | - |
| | 2 | 178 | | | | 12.2 | - |
| | \bar{x} | 151 | | | | -78.9 | - |

Table 7. Efficacy of Dimilin and Dylox 1.5 for control of Range Caterpillar.
 Experiment 7, Marley Ranch, Corona, New Mexico. August 6 to September 4, 1977.

| Material and Rate ai/A | REP | Pretreatment | | Posttreatment | | | |
|------------------------|-----------|---------------------------------|--|---------------------|-------|-------|-------|
| | | Avg. No. of Larvae/100 sq. yds. | | Avg. % Mortality at | 7 | 14 | 21 |
| Dimilin .0075 lb. | 1 | 176 | | 94.2 | 100.0 | 100.0 | 100.0 |
| | 2 | 125 | | 9.0 | 100.0 | 100.0 | 100.0 |
| | 3 | 174 | | 88.8 | 100.0 | 100.0 | 100.0 |
| | \bar{x} | 159 | | 63.9 | 100.0 | 100.0 | 100.0 |
| Dimilin .015 lb. | 1 | 319 | | 100.0 | 100.0 | 100.0 | 100.0 |
| | 2 | 528 | | 88.7 | 100.0 | 100.0 | 100.0 |
| | 3 | 100 | | 37.6 | 100.0 | 100.0 | 100.0 |
| | \bar{x} | 316 | | 75.4 | 100.0 | 100.0 | 100.0 |
| Dimilin .02 lb. | 1 | 157 | | 96.1 | 100.0 | 100.0 | 100.0 |
| | 2 | 479 | | 100.0 | 100.0 | 100.0 | 100.0 |
| | 3 | 258 | | 35.1 | 95.9 | 93.0 | 95.3 |
| | \bar{x} | 298 | | 78.6 | 98.7 | 97.7 | 98.4 |
| Dylox 1.5 (.25 lb.) | 1 | 285 | | 100.0 | 100.0 | 100.0 | 100.0 |
| | 2 | 254 | | 100.0 | 100.0 | 100.0 | 100.0 |
| | 3 | 194 | | 100.0 | 100.0 | 100.0 | 100.0 |
| | \bar{x} | 245 | | 100.0 | 100.0 | 100.0 | 100.0 |
| Control | 1 | 151 | | 54.3 | 69.0 | 89.6 | 87.8 |
| | 2 | 107 | | 21.1 | 67.2 | 38.1 | 61.8 |
| | \bar{x} | 129 | | 37.7 | 68.1 | 84.1 | 77.8 |

Table 8. Efficacy of Dimilin and Sevin 4 Oil for control of Range Caterpillar.
 Experiment 8, Marley Ranch, Corona, New Mexico. August 8 to Sept. 5, 1977.

| Material and Rate ai/A | REP | Pretreatment Avg. No. of Larvae/100 sq. yds. | Posttreatment | | | |
|------------------------|-----------|---|---------------|-------|-------|-------|
| | | | 7 | 14 | 21 | 28 |
| Dimilin .01 lb. | 1 | 184 | 77.9 | 100.0 | 100.0 | 100.0 |
| | 2 | 92 | -1.9 | 100.0 | 100.0 | 100.0 |
| | 3 | 156 | 25.5 | 91.5 | 99.0 | 99.8 |
| | \bar{x} | 144 | 33.9 | 97.2 | 99.7 | 99.9 |
| Dimilin .015 lb. | 1 | 265 | 30.0 | 99.1 | 100.0 | 100.0 |
| | 2 | 220 | 25.0 | 97.8 | 100.0 | 100.0 |
| | 3 | 276 | 34.3 | 98.7 | 100.0 | 99.8 |
| | \bar{x} | 264 | 29.8 | 98.5 | 100.0 | 99.9 |
| Dimilin .03 lb. | 1 | 54 | -39.4 | 100.0 | 100.0 | 100.0 |
| | 2 | 416 | 84.5 | 99.9 | 100.0 | 100.0 |
| | 3 | 164 | -24.7 | 97.7 | 100.0 | 100.0 |
| | \bar{x} | 212 | 6.8 | 99.2 | 100.0 | 100.0 |
| Sevin 4 (.5 lb.) | 1 | 107 | 99.2 | 99.5 | 100.0 | 100.0 |
| | 2 | 86 | 45.7 | 57.4 | 46.6 | 70.2 |
| | 3 | 98 | 59.5 | 37.5 | 47.1 | 73.2 |
| | \bar{x} | 97 | 68.1 | 64.8 | 64.6 | 81.1 |
| Control | 1 | 151 | 54.3 | 69.0 | 89.6 | 87.8 |
| | 2 | 107 | 21.1 | 67.2 | 38.1 | 61.8 |
| | \bar{x} | 129 | 37.7 | 68.1 | 84.1 | 77.8 |

Table 9. Efficacy of Dimilin, Sumathion, and Orthene for control of Range Caterpillar. Experiment 9, Roadrunner Ranch, Corona, New Mexico. August 10 to September 7, 1977.

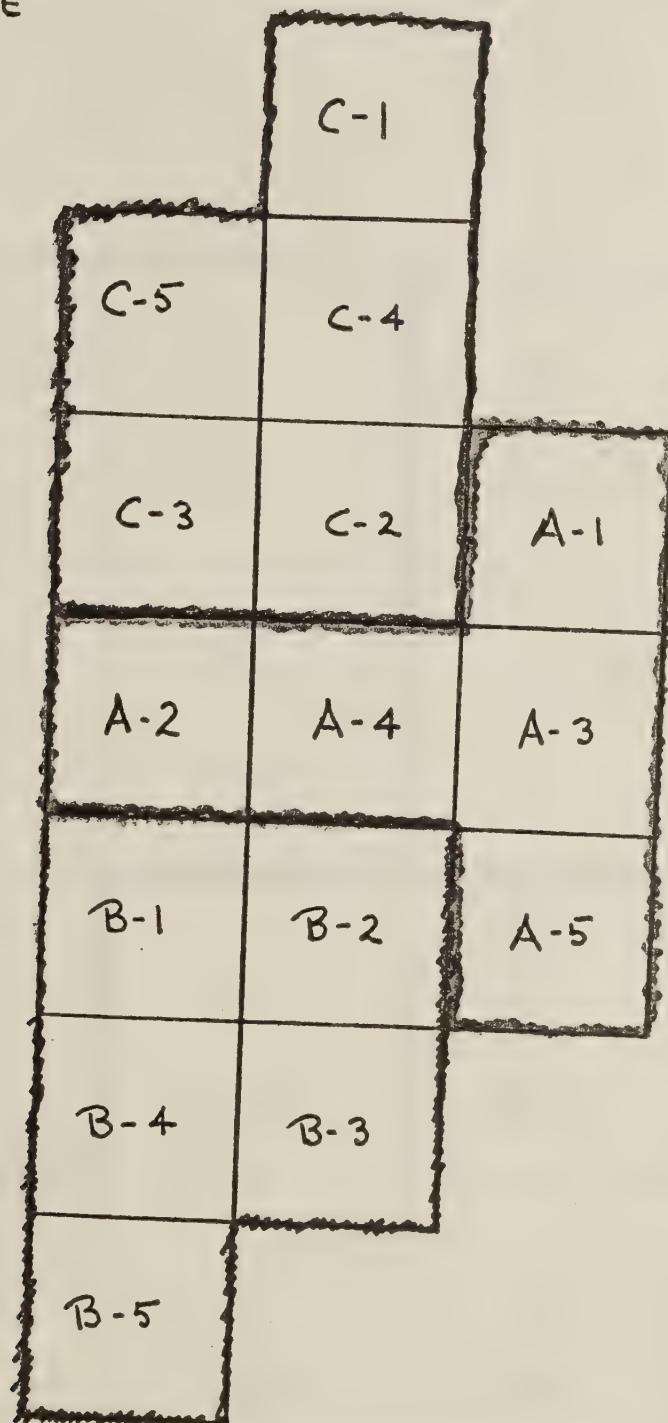
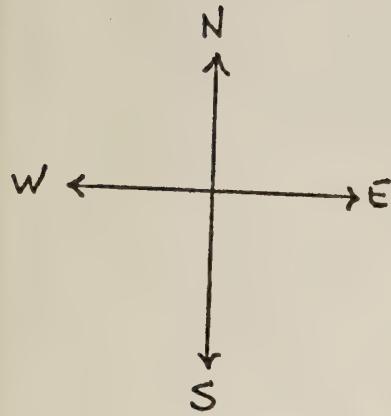
| Material and Volume/acre | REP | Pretreatment | | Posttreatment | | |
|--------------------------|-----------|---------------------------------|--|---------------|-------|-------|
| | | Avg. No. of Larvae/100 sq. yds. | | 7 | 14 | 21 |
| Dimilin (1 Pt.) | 1 | 942 | | 73.1 | 99.8 | 99.9 |
| | 2 | 403 | | 43.4 | 99.9 | 99.9 |
| | 3 | 286 | | -3.6 | 99.8 | 99.9 |
| | 4 | 136 | | 10.3 | 99.7 | 99.7 |
| | \bar{x} | 434 | | 30.8 | 99.8 | 99.9 |
| Dimilin (1 Qt.) | 1 | 371 | | 64.4 | 99.8 | 99.8 |
| | 2 | 263 | | 37.4 | 98.3 | 98.3 |
| | 3 | 385 | | 18.4 | 98.8 | 98.9 |
| | 4 | - | | - | 99.8 | 99.9 |
| | \bar{x} | 503 | | 40.0 | 99.2 | 99.4 |
| Dimilin (2 Qts.) | 1 | 402 | | 82.1 | 99.8 | 99.5 |
| | 2 | 357 | | 20.1 | 99.8 | 99.8 |
| | 3 | 466 | | 54.6 | 100.0 | 100.0 |
| | 4 | 396 | | -9.9 | 100.0 | 100.0 |
| | \bar{x} | 405 | | 36.7 | 99.9 | 99.8 |
| Dimilin (3 Qts.) | 1 | 90 | | 62.3 | 99.8 | 99.8 |
| | 2 | 290 | | 21.3 | 99.8 | 100.0 |
| | 3 | 417 | | 38.5 | 99.5 | 99.8 |
| | 4 | 741 | | 50.1 | 99.6 | 100.0 |
| | \bar{x} | 385 | | 43.0 | 99.6 | 99.9 |
| Sumathion (.25 lb.) | 1 | 290 | | 49.4 | 39.0 | 40.1 |
| | 2 | 190 | | 84.0 | 99.2 | 98.9 |
| | \bar{x} | 240 | | 66.7 | 69.1 | 69.5 |
| | | | | | | -45.1 |
| | | | | | | 99.4 |
| | | | | | | 27.2 |

Table 9 (contd.) Efficacy of Dimilin, Sumathion, and Orthene for control of Range Caterpillar. Experiment 9, Roadrunner Ranch, Corona, New Mexico. August 10 to September 7, 1977.

| Material and Volume/acre | REP | Pretreatment | | Posttreatment | | | |
|--------------------------|-----------|---------------------------------|-------|---------------------|----------------|--------|--|
| | | Avg. No. of Larvae/100 sq. yds. | | Avg. % Mortality at | Indicated Days | | |
| | | 7 | 14 | 21 | 28 | | |
| Orthene (.5 lb.) | 1 | 319 | 97.5 | 99.0 | 98.4 | 97.9 | |
| | 2 | 348 | 99.2 | 98.4 | 99.3 | 99.2 | |
| | \bar{x} | 334 | 98.3 | 98.7 | 98.8 | 98.5 | |
| Control | 1 | 157 | 18.6 | 84.5 | 78.8 | 39.6 | |
| | 2 | 366 | -56.8 | -77.8 | -81.4 | -131.5 | |
| | 3 | 704 | -4.8 | 52.0 | 50.8 | 47.5 | |
| | 4 | 359 | -3.6 | 9.1 | 18.6 | -83.5 | |
| | \bar{x} | 396 | -11.7 | 16.9 | 16.7 | -32.0 | |

APPENDIX I

Experiment 1; Mitchell Ranch, Roy, New Mexico



TREATMENTS:

- 1 - .0075 lb ai/A
- 2 - .015 lb. ai
- 3 - .02 lb. ai
- 4 - DyLox 1.5 (.25 lb/a)
- 5 - CONTROL

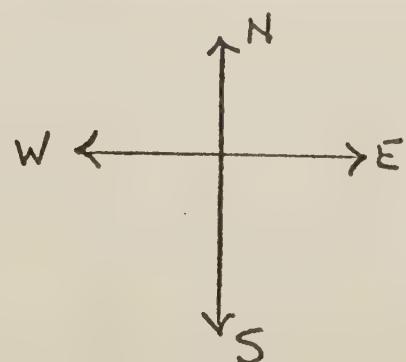
APPENDIX II

Experiment 2; Gillespie Ranch, Abbott, New Mexico

| | | | |
|-----|-----|-----|-----|
| 4 | 5 | 12 | 13 |
| A-2 | A-1 | C-2 | C-3 |
| 3 | 6 | 11 | 14 |
| A-5 | A-4 | C-1 | C-4 |
| 2 | 7 | 10 | 15 |
| A-3 | B-4 | B-3 | C-5 |
| 1 | 8 | 9 | 16 |
| B-2 | B-5 | B-1 | |

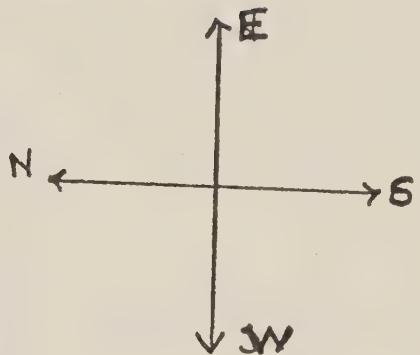
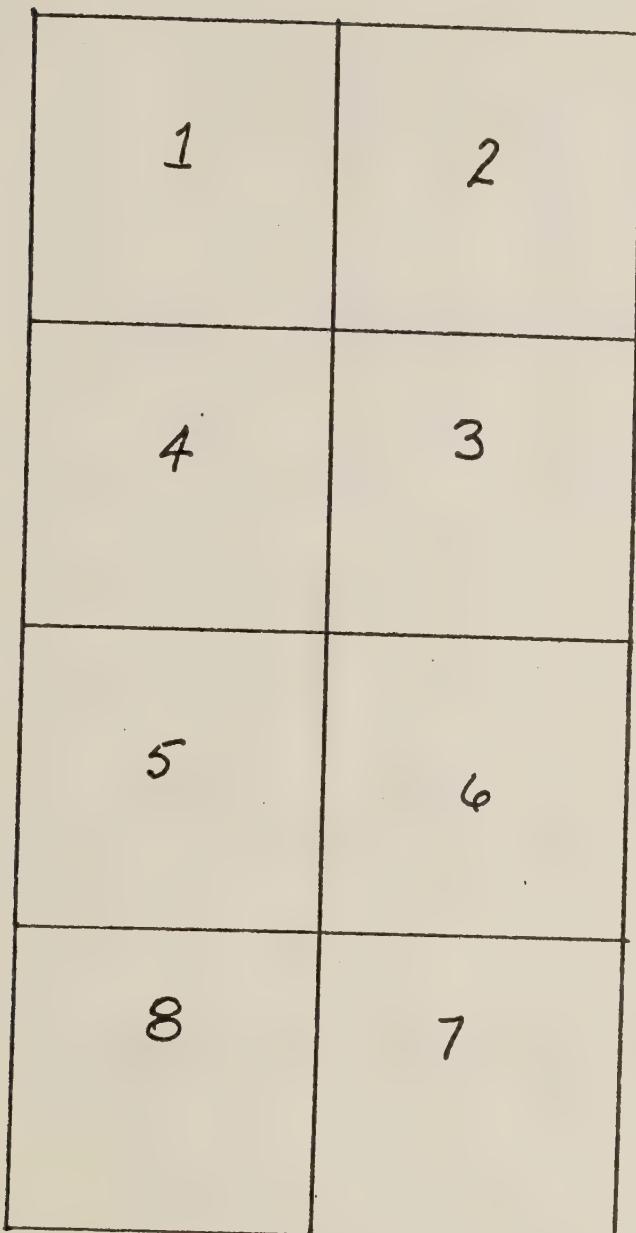
TREATMENTS:

- 1 - .0075 lb ai/A
- 2 - .015 lb ai
- 3 - .02 lb. ai
- 4 - DyLox 1.5 (.25 lb ai)
- 5 - CONTROL



APPENDIX III

Experiment 3; South Clayton, New Mexico



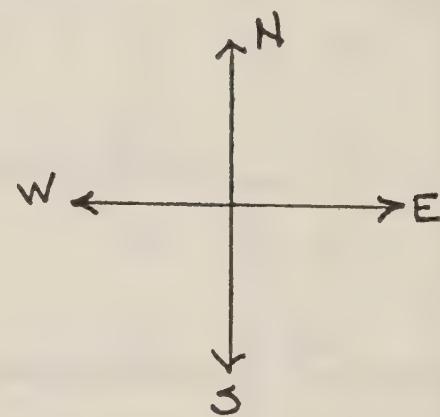
* ALL 8 PLOTS SPRAYED
WITH .015 lb. ai/A
of Dimilin AT 1 qt/A.

* TOTAL OF 320 ACRES
SPRAYED.

APPENDIX IV

Experiment 4; Roadrunner Ranch, Corona, New Mexico

| | | |
|--------------|--------------|--------------|
| 3 TRT. 1 | 2 TRT. 4 | 1 TRT. 2 |
| 4 TRT. 3 | 5 TRT. 1 | 6 TRT. 4 |
| 9 TRT. 2 | 8 TRT. 3 | 7 TRT. 1 |
| 10 TRT. 4 | 11 TRT. 2 | 12 TRT. 3 |

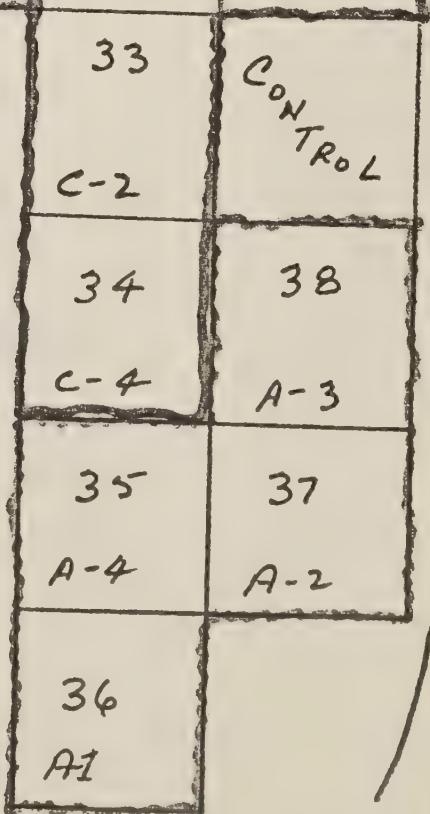
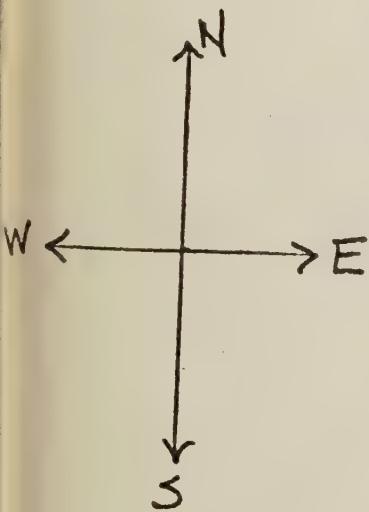
TREATMENTS:

- 1- .01 lb. ai/A
- 2- .015 lb ai
- 3- .03 lb ai.
- 4- SEVIN 4 (.5 lb/c

APPENDIX V

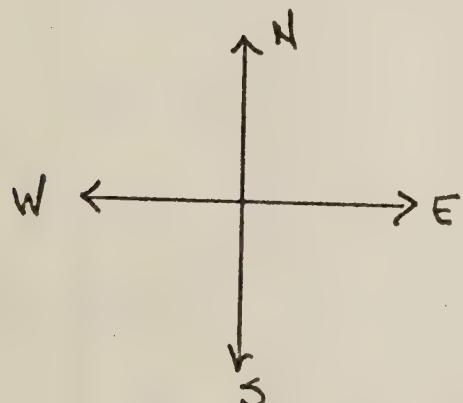
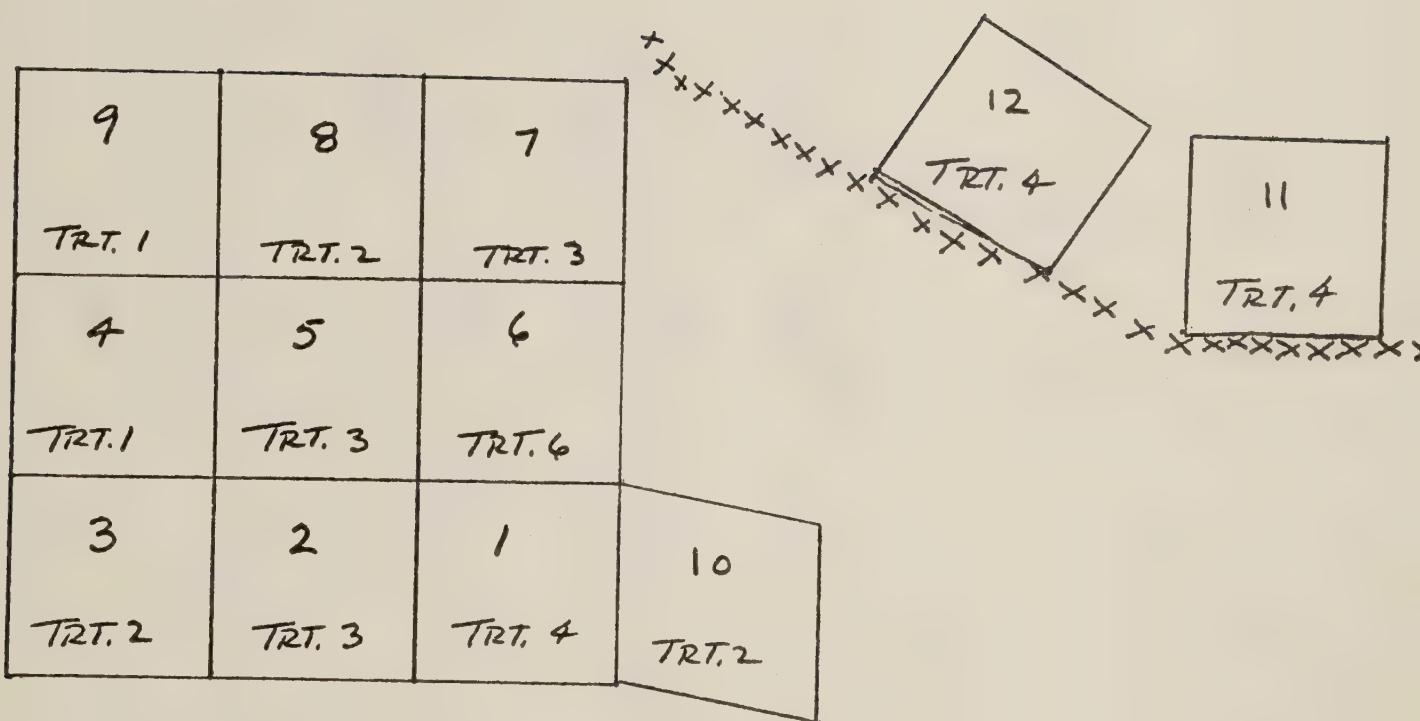
Experiment 5, 7, 8; Marley Ranch, Corona, New Mexico

| AREA I | | | AREA II | | | | | |
|--------|-----|-----|---------|-----|-----|-----|---------|-----|
| 1 | 2 | 3 | 13 | 14 | 15 | 16 | 17 | |
| A-3 | A-1 | A-4 | C-3 | A-2 | B-1 | B-2 | | B-3 |
| 6 | 5 | 4 | 22 | 21 | 20 | 19 | | 18 |
| A-2 | B-1 | B-2 | C-1 | A-4 | A-3 | A-1 | | B-4 |
| 7 | 8 | 9 | 23 | 24 | 25 | 26 | | 27 |
| C-4 | B-4 | B-3 | C-2 | C-4 | B-1 | B-4 | CONTROL | |
| 12 | 11 | 10 | 32 | 31 | 30 | 29 | | 28 |
| C-3 | C-2 | C-1 | CONTROL | B-2 | B-3 | C-3 | | C-1 |



APPENDIX VI

Experiment 6; Owens Ranch, Corona, New Mexico



* ALL PLOTS 25.6 ACRES IN SIZE

TREATMENTS

1 - .01 lb. ai/A

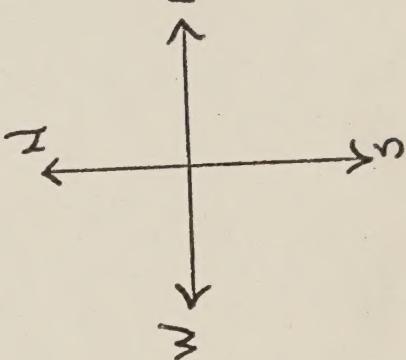
2 - .015 lb. ai/A

3 - .03 lb. ai/A

4 - SEVIN 4 (.5 lb ai/A)

| | 6 | 5 | 4 | 3 | 2 | 1 |
|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|---|
| T _{2T.2} | Control | T _{2T.3} | T _{2T.7} | Control | T _{2T.2} | |
| 7 | 8 | 9 | 10 | 11 | 12 | |
| T _{2T.1} | T _{2T.3} | T _{2T.4} | T _{2T.7} | T _{2T.1} | T _{2T.3} | |
| 18 | 17 | 16 | 15 | 14 | 13 | |
| T _{2T.1} | T _{2T.4} | Control | T _{2T.4} | T _{2T.6} | T _{2T.6} | |
| 19 | 20 | 21 | 22 | 23 | 24 | |
| T _{2T.2} | T _{2T.3} | Control | T _{2T.2} | T _{2T.1} | T _{2T.4} | |

TREATMENTS: (Dimension: 0.015 lb ai/Acre)



1- 1 PT/ACRE
 2- 1 QT/ACRE
 3- 2 QTs/ACRE
 4- 3 QTs/ACRE
 5- CONTROL
 6- SUMATHION (.25 lb ai/A)
 7- ORTHENE (.5 lb ai/A)



